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Cognitive Measures of Adolescent Depression: Unique or Unitary Constructs?

Golda S. Ginsburg,
Johns Hopkins University School of Medicine

Susan G. Silva,
Duke Clinical Research Institute, Duke University Medical Center

Rachel H. Jacobs,
Northwestern University Feinberg School of Medicine

Simon Tonev,
Duke Clinical Research Institute, Duke University Medical Center

Rick H. Hoyle,
Department of Psychology and Neuroscience, Duke University

Julie Newman Kingery,
Johns Hopkins University School of Medicine

Mark A. Reinecke,
Northwestern University Feinberg School of Medicine

John F. Curry, and
Duke Clinical Research Institute, Duke University Medical Center and Department of Psychology and Neuroscience, Duke University

John S. March
Duke Clinical Research Institute, Duke University Medical Center and Department of Psychology and Neuroscience, Duke University

Abstract

The factor structure of several self-report questionnaires assessing depression-relevant cognitions frequently employed in clinical research was examined in a sample of 390 adolescents (*M* age =14.54; 216 girls; 74% Caucasian) with current major depressive disorder enrolled in the Treatment of Adolescents with Depression Study. A four-factor solution resulted, accounting for 65% of the total variance. The factors were labeled (a) Cognitive Distortions and Maladaptive Beliefs, (b) Cognitive Avoidance, (c) Positive Outlook, and (d) Solution-Focused Thinking. Internal consistencies for the factor-based composite scores were .83, .85, .84, and .82, respectively. Girls endorsed more negative cognitions than boys on three of the four factors. Maladaptive cognitions were positively related to severity of depression and predicted treatment response. Taken together, findings indicated that there are four distinct domains of cognitions that are present among adolescents with depression that are tapped by several widely used self-report measures of cognitions.

Correspondence should be addressed to Golda S. Ginsburg, Johns Hopkins University School of Medicine, Department of Psychiatry and Behavioral Sciences, Division of Child and Adolescent Psychiatry, 600 North Wolfe Street/CMSC 346, Baltimore, MD 21287-3325. gginsbu@jhmi.edu.

Cognitive theories have generated a number of constructs to explain the development and course of depression. Along with these theories have emerged age-appropriate measures to assess these specific constructs. Individually, measures of cognitive biases have generally supported the theoretical constructs they purport to reflect (for a review, see Jacobs, Reinecke, Gollan, & Kane, 2008). For example, studies using the Children's Negative Cognitive Error Questionnaire have found that depressed children and adolescents, compared to their nondepressed peers, endorse more cognitive distortions including catastrophizing, overgeneralizing, and personalizing (Epkins, 1998; Leitenberg, Yost, & Carroll-Wilson, 1986; Messer, Kempton, VanHasselt, Null, & Bukstein, 1994; Robins & Hinkley, 1989). Similarly, negative views of the self, world, and the future, as measured by the Cognitive Triad Inventory for Children, are higher among depressed youth relative to their nondepressed peers (Greening, Stoppelbein, Dhossche, & Martin, 2005; Jacobs & Joseph, 1997; Kaslow, Stark, Printz, Livingston, & Tsai, 1992). Along the same lines, deficits in social problem solving, as measured by the the Social Problem Solving Inventory–Revised, have been linked to adolescent depression and suicidality and have been found to predict treatment response (Adams & Adams, 1996; Asarnow, Carlson, & Guthrie, 1987; Frye & Goodman, 2000; Kashden, Fremouw, & Callahan, 1993; Reinecke, DuBois, & Schultz, 2001; Rotheram-Borus, Trautman, Dopkins, & Shrout, 1990; Spirito, Overholser, & Stark, 1989).

The expansion in the number of theoretical constructs related to depressotypic cognitions has potential advantages for refining and clarifying theory related to the role of cognition in the risk for, and course of, depression. However, potential disadvantages also exist. Specifically, it is unclear whether these cognitive constructs and associated measures reflect unique constructs or whether these measures tap overlapping or higher order cognitive constructs. Identifying the overlapping and unique contributions of these cognitive measures has been the focus of previous research. Indeed several studies have attempted to identify higher order cognitive factors in adults (e.g., Hankin, Lakdawalla, Carter, Abela, & Adams, 2007; Joiner & Rudd, 1996; Reno & Halaris, 1989). To date, however, only three studies have focused on youth (Adams, Abela, & Hankin, 2007; Garber, Weiss, & Shanley, 1993; Gotlib, Lewinsohn, Seeley, Rohde, & Redner, 1993). Consequently, additional research is needed with youth that is aimed at identifying potential higher order cognitive constructs, particularly among measures routinely used in clinical research but that have not been included in previous factor analytic studies.

Findings from the three factor analytic studies conducted with youth are difficult to synthesize because of differences in the ages and diagnoses (clinically depressed vs. nonclinical community samples) of the participants as well as the specific measures included. The first study involved confirmatory factor analysis on six cognitive measures among a large community sample of adolescents (ages 14–18; Gotlib et al., 1993). The analyses identified two factors: negative cognitions (comprising items reflecting dysfunctional attitudes, perceived control, self-esteem, self-reinforcement, and subjective probabilities) and attributional style. A criticism of this study was that a measure of depressive symptoms was not included in this factor analysis. The inclusion of a measure of depression aids researchers in distinguishing cognitive concomitants versus vulnerability factors.

The second factor analytic study was conducted by Garber and colleagues (1993). In their study, using a sample of adolescents in Grades 7 through 12, they performed an unweighted least squares factor analysis and used the scree-plot criterion to identify higher order factors on nine cognitive measures (Garber, Weiss, & Shanley, 1993). Results identified two factors, the first reflecting depressive cognitions and the second reflecting anxious thinking (i.e., egocentrism and self-consciousness). This study also did not include a measure of depressive symptoms. Finally, a study by Adams and colleagues (2007) examined the factor structure of 12 cognitive measures using a community sample of seventh graders. These researchers used

principal components analysis and identified five components: coping, self-view, pessimism, depressive symptoms, and attributional style. Consistent with the two previous studies, items from different cognitive measures associated with theoretical models of depression loaded on the same factor, suggesting that there is indeed overlap among extant measures. Of importance, and consistent with adult studies, measures of depressive symptoms loaded on a separate factor, confirming that such cognitive factors are not merely state related concomitants of depressive symptoms.

The primary aim of the present study was to extend this literature by evaluating the factor structure of five questionnaires that assess depression-related cognitions that are used routinely in clinical research but have not been included in previous studies with youth, with a clinically depressed sample of adolescents enrolled in the Treatment for Adolescents with Depression Study (TADS). Each of the specific measures used in the current study represent contructs that have been theorized to increase adolescents' vulnerability to developing and/or maintaining their depression. Identifying their overlapping and unique contributions has the potential to refine theoretical models of depression, inform and guide the assessment of depressotypic cognitions, and ultimately shape intervention strategies. Utilizing measures that have not been included in previous studies but that are used in clinical research is advantageous because of the potential to provide new knowledge about the construct validity of these questionnaires and their overlap with each other. Practically, findings will influence the number of measures patients need to complete to understand their cognitive style and to track intervention response, potentially reducing patient burden.

In addition to examing the factor structure of these measures, we examined whether higher order factors would predict and/or moderate treatment outcome. Although no study with youth has directly addressed this issue, Reno and Halaris (1989) reported that higher order factors of cognitions among adults were associated with treatment response and relapse. Curry and colleagues also found that teens with higher levels of cognitive disortions (as measured by the total score of the Children's Negative Cognitive Error Questionnaire [CNCEQ]) moderated, and higher levels of hopelessness predicted, poorer treatment response in TADS (Curry et al., 2006). The identification of predictors and moderators of treatment outcome is useful in identifying for whom treatment will be the most effective (e.g., Curry et al., 2006). In addition, because interventions often target cognitive constructs (e.g., reducing catastrophizing, improving problem-solving skills), examining whether these targets change with treatment or predict treatment response can lead to refining and personalizing treatments.

The present study also examined (a) the extent to which identified factors were associated with symptoms of depression (measured via self-report as well as by an independent evaluator) as a test of construct validity; (b) the relation between these cognitive factors and gender, as cognitive style has been implicated as one of the explanations offered for the gender differences in rates of depression; and (c) whether these factors varied by development (early adolescence vs. late adolescence). We hypothesized that more than one factor would be identified, that adolescents endorsing more maladaptive cognitions would report higher levels of depressive symptoms, that teens reporting more maladaptive cognitions at baseline would demonstrate a poorer treatment outcome, and that girls would endorse more maladaptive cognitions than boys, but that factors would not vary as a function of age.

METHOD

Participants

Participants were 439 adolescents (ages 12–18 years; 74% Caucasian) who were enrolled in the TADS, a multicenter randomized clinical trial designed to evaluate the effectiveness of four treatments (i.e., cognitive behavioral therapy [CBT], fluoxetine [FLX], their combination

[COMB], a pill placebo [PBO]) for adolescents with a primary *Diagnostic and Statistical Manual of Mental Disorders* (4th ed.; American Psychiatric Association, 1994) diagnosis of current major depressive disorder (for inclusion and exclusion criteria, see The TADS Team, 2005). Participants ranged in age from 12 to 17 years at the time of consent and start of the screening process. However, 1 participant turned 18 immediately before the baseline assessment. The rationale, design, methods, sample characteristics, and the 12- and 36-week treatment outcome results are detailed in prior reports (TADS Team, 2003, 2004, 2005, 2007). As previous publications detail (TADS Team, 2004), all treatments resulted in statistically significant reductions in depression and COMB generally offered the most favorable tradeoff between benefit and risk.

For the present study, 49 participants were excluded due to missing or incomplete forms at the baseline assessment (N =390, 216 girls). There were no statistical differences with regard to age, gender, or depression severity in those youths included versus excluded from the current subsample. Moreover, using the current sample of 390, the TADS (2004) acute treatment findings were replicated.

Measures

Beck Hopelessness Scale (BHS)—The BHS (Beck & Steer, 1988) is a self-report measure that assesses negative expectations about the future with 20 true–false statements. Sample items include, “My future seems dark to me” and “Things just don’t work out the way I want them to.” The measure yields a total score ranging from 0 to 20, with higher scores indicating greater levels of hopelessness. Although the BHS was originally developed for use with adults, it has been determined to be appropriate for use with adolescents, with data showing an internal consistency of .86 and convergent and discriminant validity (Steer, Kumar, & Beck, 1993).

CNCEQ—The CNCEQ (Leitenberg et al., 1986) is a 24-item self-report measure designed to assess four types of cognitive distortions (i.e., catastrophizing, overgeneralizing, personalizing, and selective abstraction) across three content areas (i.e., social, academic, athletic). Respondents rate each item on a 5-point scale from 1 (*almost exactly like I would think*) to 5 (*not at all like I would think*). A sample item in the academic domain of personalization reads, “You and three other students completed a group science project. Your teacher did not think it was very good and gave your group a poor grade. You think ‘If I hadn’t done such a lousy job, we would have gotten a good grade.”’ As required, items were reverse coded and a total score was used. Leitenberg et al. developed this measure with fourth-, sixth-, and eighth-grade students and reported adequate test–retest reliabilities (.65) and moderate to high internal consistencies (.89 for total score) for this measure. Studies have utilized the CNCEQ with older adolescents (e.g., Kolko, Brent, Baugher, Bridge, & Birmaher, 2000) and a recent study (Kingery et al., 2009) found support for this measure’s construct validity with the TADS sample.

Cognitive Triad Inventory for Children (CTI–C)—The version of the CTI–C (Kaslow et al., 1992) used in the present study was a 24-item self-report measure that consists of the two subscales (12 items each): View of the Self and View of the World (the Views of the Future subscale was excluded from the original data collection because of overlap in content with the BHS). Higher scores indicated more positive views. Sample items include, “I have messed up almost all the best friendships I have ever had” and “My family doesn’t care what happens to me.” Acceptable psychometric properties have been reported for ages 9 through 14 (Kaslow et al., 1992), 13 through 16 year-olds (Jacobs & Joseph, 1997), and ages 14 through 17 (Greening et al., 2005).

Dysfunctional Attitudes Scale (DAS)—The DAS (Weissman & Beck, 1978) is a 40-item self-report measure of maladaptive contingencies of self-worth. It utilizes a 7-point Likert scale, anchored by *totally disagree* and *totally agree*. Sample items include, "It is difficult to be happy unless one is good looking, intelligent, rich and creative" and "My value as a person depends greatly on what others think of me." In the present study, the Perfectionism and Need for Social Approval subscales were used. These two scales were identified by Imber and colleagues in analysis of adult data (Imber et al., 1990). These same subscales were also recently identified in the TADS adolescent sample (Rogers et al., 2009). The DAS was originally developed for adults but has been used widely with adolescent samples (e.g., Martin, Kazarian, & Brieter, 1995). Internal consistency is good and stability is excellent over 8 weeks (Garber et al., 1993; Marton, Churchard, & Kutcher, 1993).

Social Problem-Solving Inventory–Revised (SPSI–R)—The SPSI–R (D'Zurilla, Nezu, & Maydeu-Olivares, 2003) is a 52-item self-report questionnaire with five subscales that assess functional and dysfunctional cognitive and emotional orientations toward solving life problems. The subscales include Positive Problem Orientation (PPO; 5 items) and Negative Problem Orientation (NPO; 10 items), Rational Problem Solving (RPS; 20 items; e.g., "When I have a problem to solve, one of the things I do is analyze the situation and try to identify what obstacles are keeping me from getting what I want"), Impulsivity-Carelessness Style (ICS; 10 items, e.g., "When I am attempting to solve a problem, I act on the first idea that occurs to me"), and Avoidant Style (AS; 7 items, e.g., "I prefer to avoid thinking about the problems in my life instead of trying to solve them"). Higher scores on the NPO, ICS, and AS reflect a more maladaptive approach to problem solving, whereas higher scores on the PPO and RPS indicate more adaptive problem solving. The SPSI–R was originally developed for use with adults. Sadowski, Moore, and Kelley (1994) explored the psychometric properties of the SPSI–R among adolescents between 13 and 17. Internal consistency estimates were adequate with coefficients between .85 and .90 for the total score and between .62 and .88 among the subscales.

Children's Depression Rating Scale–Revised (CDRS–R)—The CDRS-R (Poznanski & Mokros, 1996) is a clinician-administered 17-item measure that assesses the presence and severity of depressive symptomatology in youth. The CDRS–R total score was used in the current study. This score is based on an independent evaluator's interviews with the adolescent and parent separately and provides the clinician's best description of the severity of depression in the youth. This scale has been widely used with adolescents and has good internal consistency, interrater reliability, and test–retest reliability and is correlated with a range of validity indicators including global ratings and diagnoses of depression (Guo, Nilsson, Heiligenstein, Wilson, & Emslie, 2006; Poznanski & Mokros, 1996; TADS, 2004; TADS, 2005).

Reynolds Adolescent Depression Scale (RADS)—The RADS (Reynolds, 1987) is a 30-item self- report measure of current depressive symptomatology. This measure utilizes a 4-point Likert scale and has excellent internal consistency and good test–retest reliability with this age population (Melvin et al., 2006; Reynolds, 1987; TADS, 2005). The total score was used in the present study and higher scores reflected more severe depression.

Procedure

All of the measures just mentioned were administered during a baseline assessment that was conducted after informed consent/assent were obtained and immediately prior to randomization to a treatment arm. Details of the research design and methods of the TADS are described elsewhere (TADS, 2003). Briefly, after the baseline assessment was completed and eligibility confirmed, adolescents were randomly assigned to receive one of four possible

treatment conditions: FLX (*n* =109), CBT (*n* =111), COMB (*n* =107), or PBO (*n* =112). The trial was double-blind for the FLX and PBO conditions and single-blind for the CBT and COMB conditions. After the baseline assessment, follow-up assessments were conducted at 6 and 12 weeks for the CDRS-R, RADS, BHS, DAS, and SPSI-R. All other measures were collected only at Week 12.

Statistical Analyses

Factor analyses—A principal axis factor analysis with oblique rotation (Promax) was used to explore the factor structure of scores from five self-report cognitive questionnaires (BHS, CNCEQ, CTI–C, DAS, SPSI–R) gathered as part of the baseline assessment. A parallel analysis (Glorfeld, 1995) was conducted to determine the number of factors to extract and rotate. Although confirmatory factor analysis would have allowed tests of hypotheses about the latent structure of the scores, we had no firm expectations about the number of factors or the loading of scores on them. Our sole expectation was that more than one factor would be needed to account for commonality among the scores. As a result, parallel analysis was deemed most appropriate.

To determine the degree to which these factors could be distinguished from depression, the measures were factored a second time with our primary measure of depression severity (CDRS–R) included. The aforementioned analyses were also implemented separately for girls and boys and for younger and older participants, allowing for an informal comparison of number of factors, pattern and strength of loadings, and interfactor correlations across these dimensions. Supplemental analyses were also conducted using Wilcoxon two-sample tests to examine possible gender and age subgroup differences on the factor-based scores derived from the 390 youths in the subsample. Nonparametric tests were applied for the aforementioned age and gender subgroup comparisons because of the variability and skewness within the subgroups. Pearson correlation coefficients were used to assess the association between the factor-based scores and depression severity (CDRS–R and RADS). Nondirectional tests, with the level of significance set at .05, were implemented.

Predictor and moderator analyses—Using the methodological approach described by Kraemer, Wilson, Fairburn, and Agras (2002), we then evaluated whether each cognitive factor was a nonspecific predictor and a moderator of treatment outcome. By definition, a pretreatment variable that significantly influences outcome regardless of treatment condition is a predictor. A pretreatment variable, on the other hand, that interacts significantly with treatment is considered a moderator of outcome. A separate random regression model (RRM) was conducted for each cognitive factor to evaluate whether the factors predicted and moderated depression severity over time, as measured by the CDRS–R and RADS total scores. The RRM models evaluated the (a) random effects of patient and patient by time and (b) fixed effects of treatment, time, the cognitive factor (under consideration) and their two-and three-way interactions. The fixed effect of site was included because treatments are nested within site and time was defined as the natural log of time. This is the same analytic approach applied in the primary intent-to-treat analysis for TADS, except that the RRM did not include any cognitive factors. When a moderator effect was demonstrated by a significant Factor × Treatment interaction, the cognitive factor was divided into low and high subgroups and an RRM was conducted within each subgroup. Because these analyses were considered exploratory rather than confirmatory, the traditional alpha level of .05 was retained for all statistical tests.

RESULTS

Descriptive Statistics

Means, standard deviations, and internal consistencies for all measures are provided in Table 1. Correlations among the measures are presented in Table 2.

Cognitive Measures Factor Analysis

Initial communality estimates ranged from .48 to .69 (*M* =.59), providing strong support for a search for common factors. The parallel analysis indicated that the first four factors could account for commonality at a level beyond chance, accounting for 65% of the total variance and 100% of the common variance in scores on the scales. Using a salience criterion of .30, rotation produced a clean factor pattern matrix approaching simple structure. The pattern of loadings and interfactor correlations are presented in Table 3. All scores loaded between .61 and .85 on their primary factor (*M* =.75) and no higher than .22 (*M* =.06) on the remaining factors.

Table 3 details the factor loadings of each item on the four-factor solution. Factor-based scores were derived for each of the four identified factors and each score was obtained by converting the original scores to *Z* scores and summing each *Z* score with a factor loading of .40 or greater. Factors were labeled based on a consensus by the authors. Factor 1, labeled Cognitive Distortions and Maladaptive Beliefs, contained three scales involving perfectionistic expectations, need for social approval, and cognitive distortions (e.g., personalization, overgeneralization). Factor 2, labeled Cognitive Avoidance, contained three variables related to impulsive, avoidant, and negative problem-solving styles. Factor 3, labeled Positive Outlook, included positive beliefs about the self and the world (from the CTI) and low scores on hopelessness (from the BHS). Factor 4, Solution-Focused Thinking, contained two variables related to positive problem solving. For Factors 1 and 2, higher scores reflected a tendency to endorse greater amounts of cognitive distortions and negative beliefs and cognitive avoidance. For Factors 3 and 4, higher scores indicated more positive beliefs about oneself, the world, and the future and higher levels of solution-focused thinking, respectively.

All factors demonstrated acceptable levels of internal consistency (αs =.83, .85, .84, and .82, respectively). The interfactor correlations are presented at the bottom of Table 3. The majority of the correlations among these factors were moderate, the exception being Factor 4, which was virtually independent of Factors 1 and 2. The baseline mean (*M*) and standard deviation (*SD*) for each factor score for the 390 youths were as follows: Factor 1, *M* =1.2, *SD* =2.5; Factor 2, *M* =1.1, *SD* =2.6; Factor 3, *M* =−1.7, *SD* =2.5; Factor 4, *M* =−0.2, *SD* =1.7.

Relation to Depression

As noted, scores on these scales are assumed to be associated with depression but separate from it. To evaluate this assumption, we factored the scales a second time with the total score on the CDRS–R included. If the four factors identified in the initial factor are nothing more than proxies for depression, we would expect the CDRS–R score to load on all of the factors. Instead, the analysis revealed no change in the pattern of loadings and only trivial changes in the magnitude of the loadings when the CDRS–R was included. Furthermore, the CDRS–R loadings were small, ranging from −.31 on the first factor to −.03, .05, and −.04 on the second, third, and fourth factors, respectively. Thus, there was limited evidence that these cognitive factors are proxies for depression.

Pearson product-moment correlations were calculated to examine the associations between the factor-based scores and measures of depression. Results revealed that Factors 1 and 2 were

significantly and positively correlated with depression, whereas scores on Factors 3 and 4 were significantly and negatively correlated with depression (see Table 4).

Relation to Gender

The subsamples of boys (n =174) and girls (n =216) were sufficiently large to allow for exploratory analyses by gender. Separate parallel analyses clearly indicated four factors for both boys and girls, and the rotated solutions were virtually identical. This informal comparison suggests that the factor structure was invariant across gender.

Wilcoxon tests revealed gender differences on three of the four factor scores, with girls endorsing significantly more maladaptive cognitions than boys. The scores for girls was significantly higher than boys on Factor 1 (median: boys =1.2, girls =1.5; Z =−2.1, p =.0380) and Factor 2 (median: boys =.9, girls =1.5; Z =−3.4, p =.0008). In contrast, the scores for girls was significantly lower on Factor 4 (median: boys =.1, girls =−.5; Z =2.3, p =.0207); no statistical difference was found on Factor 3 (median: boys =−1.6, girls = −1.8; Z =1.6, p =. 1177). Higher scores on Factors 1 and 2 and lower scores on Factors 3 and 4 indicate a greater degree of negative and/or maladaptive cognitions.

Relation to Age

To examine the factor structure as a function of age, the participants were grouped into younger (12–14 years, n =185) and older (15–17 years, n =205) youth. Again, separate parallel analyses indicated four factors for both groups and rotated solutions that were virtually indistinguishable. Wilcoxon two-sample tests revealed that younger and older subgroups did not differ significantly on any of the cognitive factors (all ps >.05).

Relation to Treatment Outcome

The results of the RRM without the cognitive factor and its interactions in the model for the 390 youths in the subsample replicated the TADS primary findings (TADS, 2004). There were significant Treatment × Time Time effects on both outcome measures, with the ordering of effects regarding improvement in depression at the end of acute treatment for this subsample as follows: COMB =FLX >CBT =PBO for CDRS–R and COMB >FLX >CBT =PBO for RADS.

As detailed in Table 5, cognitive Factors 1 to 3 were predictors but not moderators of the CDRS–R scores over time. More specifically, the main effects of Factor 1 (p =.0007), Factor 2 (p =.0031), and Factor 3 (p <.0001) were statistically significant, but the Factor × Treatment or Factor × Treatment × Time interactions terms were not statistically significant (p >.05).

The RADS analysis yielded slightly different findings. Cognitive Factor 1 was a significant predictor of outcome (Factor 1 main effect: p <.001), whereas Cognitive Factors 2 and 3 moderated outcome as demonstrated by a significant Factor ×Treatment ×Interaction term (Factor 2 interaction: p =.0325; Factor 3 interaction: p =.0028). As with CDRS–R, Cognitive Factor 4 was neither a predictor nor moderator of outcome (Factor main and interaction terms: p >.05).

To examine the moderation effects, the baseline scores for Factors 2 and 3 were subdivided into low or high scores based on the factor median (Factor 2: median = 1.14; Factor 2: median = − 1.72). For both factors, the Treatment × Time interactions within each subgroup were significant (Factor 2: low p =.0081, high p <.0001; Factor 3: low p <.0001, high p =.0158). Paired contrasts indicated the following ordering of effects at Week 12 in terms of depression improvement: For Factor 2 (Cognitive Avoidance) youth who engaged in less cognitive avoidance did best in combination treatment (COMB >FLX = CBT = PBO), whereas youth

with higher levels of cognitive avoidance did equally well in combination and medication-only treatment (COMB = FLX >CBT = PBO). With respect to Factor 3 (Positive Outlook), youth with more negative cognitions (i.e., a more negative outlook and greater hopelessness) did better in combination and medication only (COMB = FLX >CBT; COMB >PBO; FLX, PBO = CBT). For youth with higher scores (i.e., a more positive outlook) combination treatment was superior (COMB >FLX = CBT = PBO).

DISCUSSION

The current study examined the factor structure of several cognitive measures of depression among a large sample of clinically depressed adolescents. The relations between extracted factors, depression severity, and treatment response were also assessed. Findings revealed that a four-factor solution best fit the data. These factors were consistent for girls and boys as well as younger and older adolescents. Factors were also related to severity of depression and treatment outcome. The current study advances the existing literature on higher order cognitive factors associated with depression in several respects. First, it examined whether cognitive factors were associated with treatment response. Similar to Reno and Halaris's (1989) findings with adults, we found that cognitive factors were predictive of treatment response, such that adolescents with more maladaptive cognitions showed a poorer response to treatment. Second, our study included a measure of depression that was conducted by an independent evaluator. Our finding that cognitive measures did not load with depression (independent evaluator or self-rated) supports previous findings (i.e., Adams et al., 2007) that lend evidence against the notion that negative cognitions are merely a proxy for depression.

Factor Analyses

Overall, results from our factor analysis suggested that measures of depression-related cognitions used frequently in clinical research could be synthesized into four constructs labeled: Cognitive Distortions and Negative Beliefs (Factor 1), Cognitive Avoidance (Factor 2), Positive Outlook (Factor 3), and Solution-Focused Thinking (Factor 4). Factor 1, labeled Cognitive Distortions and Negative Beliefs, contained three variables reflecting perfectionistic expectations, an unrealistic need for social approval, and specific cognitive distortions (e.g., personalization, overgeneralization). Consistent with previous research, teens who set unrealistically high standards for themselves, based their self-worth on the approval of others, and engaged in cognitive distortions also reported high levels of depressive symptoms. The tendency to endorse such cognitive distortions and negative beliefs accounted for approximately 30% of the variance in teen-reported depression scores and 5% of depression scores as rated by an independent evaluator. The difference in the magnitude of these values most likely reflects a combination of both method invariance (both RADS and cognitive measures are completed by adolescents) and item overlap, as the items on the RADS have a greater overlap with cognitive measures than does the CDRS.

The second factor, Cognitive Avoidance, contained three variables from the same measure (i.e., the SPSI–R), reflecting adolescents' desire or tendency to avoid problems and use an impulsive problem-solving approach. Teens scoring high on this factor preferred to wait to see if a problem would resolve itself before trying to solve it. They also preferred to put off solving problems until it was too late, reported failing to evaluate their options and acting on the first idea that occurred to them (not thinking about the effect of their actions on others). Not surprisingly, higher scores on this factor were also positively associated with severity of depressive symptoms, a finding consistent with prior research with adolescents (Reinecke, DuBois, & Schultz, 2001) and adults (Blalock & Joiner, 2000). Cognitive avoidance accounted for approximately 21% of the variance in teen-reported depression scores and 3% of the variance in depression scores as rated by an independent evaluator. Conceptually, items on this

factor are similar in content to avoidant coping skills (Compas, Connor-Smith, Saltzman, Thomsen, & Wadsworth, 2001). For instance, adolescents who use a passive and avoidant coping style when faced with challenges or problems tend to be more depressed (Herman-Stahl & Petersen, 1999). Items on this factor are also in line with Nolen-Hoeksema's (1991) response styles theory, which suggests that one cause or risk factor for depression is a passive, rumminative, avoidant approach to problem solving. These deficits likely contribute to depression by leading teens to engage in behaviors that interfere with successful outcomes or social relationships.

The third factor, labeled Positive Outlook, was composed of three variables—positive views of the self and the world (from the CTI–C) and lower hopelessness (total score of the BHS). Teens scoring low on this factor tended to endorse pessimistic views about their future, felt that they personally were deficient in some way, and felt unloved by others. Low scores were associated with greater depression severity, and this factor accounted for approximately 46% of the variance in teen-reported depression scores and 9% of the variance in depression scores as rated by an independent evaluator. Our finding that items from the CTI–C and BHS loaded on a factor separate from maladaptive cognitions and beliefs is in line with Beck's (1979) proposal of the negative cognitive triad.

The fourth factor, Solution-Focused Thinking, comprised two variables (also from the SPSI–R) reflecting adolescents' perceptions of their ability to solve problems. Teens scoring high on this factor preferred to analyze problem situations by getting as many facts about the problem as possible and by identifying what obstacles might prevent them from resolving the situation. These teens were also more likely to set a specific goal and to clarify solutions, and even when their efforts to solve a problem failed, they thought that if they persisted, a good solution would emerge. Items on this factor are conceptually similar to Bandura's (1977) concept of "self-efficacy" in that it addresses a sense of confidence in one's ability to resolve life's travails and challenges. Lower scores on this factor were associated with more severe depression; however, it accounted for a very small percentage of the variance (i.e., 2% for both teen report and independent evaluator-rated depression at baseline).

Although this factor structure was similar for boys and girls, girls endorsed a more negative cognitive style than boys on three of the four factors. This is consistent with previous research and has been offered as one explanation for the higher prevalence of symptoms of depression in girls during adolescence (Angold & Rutter, 1992; Hankin & Abramson, 2001). Gender was not a predictor of acute treatment response in TADS (Curry et al., 2006). Thus, gender-linked factors, such as maladative cognitions, may be more critical to depression severity and treatment outcome than gender alone. Additional research on gender-linked factors for both boys and girls is needed.

We did not find relations between age, depression severity, and maladaptive cognitions. These findings confirm those of Garber and colleagues (1993) suggesting that by early adolescence the capacity to engage in depressotypic thinking is already well developed. In contrast to Garber's findings, however, we found that dysfunctional cognition was relatively differentiated. Thus distinctions between maladaptive cognitive factors may become more pronounced with depression severity, as opposed to increasing cognitive maturity. It is worth noting that Garber's sample was drawn from the community and that the current study did not look at anxiety as was done in the Garber et al. study.

Relation to Treatment Outcome

Three of the four factors predicted treatment response. Specifically, youth who endorsed more negative beliefs and distorted cognitions (Factor 1), had a more avoidant cognitive style (Factor 2), and endorsed a more negative outlook about the world and themselves (Factor 3) prior to

treatment were less likely to show improvement on ratings of depression after 12 weeks of treatment, regardless of whether they received CBT, FLX, COMB, or PBO. This finding is intriguing and suggests the importance of assessing and reducing these maladaptive cognitions and cognitive avoidance as a means of augmenting current treatment approaches (both medication and CBT) for adolescent depression. Uniquely, however, cognitive avoidance (Factor 2) and a positive outlook (Factor 3) also moderated treatment response for self-reported depression, such that those youth with more severe cognitive avoidance and a more negative outlook prior to treatment showed the greatest improvement (i.e., reduction in depressive symptoms) with COMB or FLX alone. This finding suggests that assessing cognitive avoidance and negative/positive self-statements may help personalize the selection of intervention strategies (i.e., use combination or medication) to enhance treatment response.

In contrast to our hypotheses, scores on Factor 4 (solution-focused thinking) were not found to either predict or moderate treatment response. The limited relation between solution–focused thinking, depression severity, and treatment outcome was surprising for several reasons. Research has suggested that active engagement in positive problem solving is associated with lower internalizing problems (Compas et al., 2001). Moreover, many interventions for depression focus on teaching problem-solving skills, and these interventions have been found to reduce depressive symptoms (Lewinsohn, Clarke, & Rohde, 1994). One possible explanation for the limited association between this factor and treatment outcome may be related to what called the power of nonnegative thinking (Kendall 1984; Kendall & Korgeski, 1979). That is, it may be that the *absence of negative problem solving or cognitions*, rather than the presence of positive, more adaptive thinking and problem-solving strategies, is more critical to the maintenance or reduction of depressive symptoms. Supporting this hypothesis, Treadwell and Kendall (1996) found that negative but not positive cognitions were mediators of treatment response in a study of CBT for youth with anxiety disorders. Further research is needed to test this hypothesis among depressed youth. Moreover, the findings with respect to treatment response are limited to changes after only 12 weeks of treatment. Examining longer term outcomes will be important for learning more about the role of these cognitive factors with respect to treatment response and perhaps identifying their varying influences over time.

Limitations

Findings from the present study should be interpreted in the context of several limitations and will need to be replicated. Specifically, although the results of our exploratory factor analysis were clear and supported by parallel analysis, the structure awaits additional testing on an independent sample using confirmatory factor analysis. In addition, the moderator analyses also need replicating as they were only found for self-reported depression. The design of our study does not allow us to examine the development of these specific cognitions as they relate to the development and onset of depression (i.e., whether these factors were indeed premorbid vulnerabilities that interacted with negative life events). Our study could not examine whether one cognitive factor led to another or whether these cognitions developed in tandem. We did not include all available measures of depressotypic cognition. Rather, decisions were made at the inception of the TADS in 1998 to include measures that were widely clinically used, minimized participant burden, and still captured a wide range of factors targeted by CBT. Given the research progress in new developmentally appropriate and reliable measures, such as the Children's Cognitive Style Questionnaire (Abela, 2001), future studies should examine how these new measures relate to our identified factors. Some have noted the relation of cognitive factors to neuroticism (e.g., Hankin et al., 2007). Unfortunately, our study did not include a measure of neuroticism; thus, we cannot rule out that neuroticism may underlie cognitive factors associated with depression. Moreover, all cognitive measures were self-report and are thus subject to bias inherent in this method of assessment (e.g., social desirability, poor comprehension). Research including more latent measures of depressotypic cognition, such as

information-processing paradigms, may further refine researchers' working knowledge of depressotypic cognition.

Our findings may not generalize to community samples of nondepressed youth who are at risk for depression or those who are already depressed but are not seeking treatment. Although the focus of the current article was to understand the role of these cognitions among treatment seeking youth, whether differences would result in the factorial categorization of these constructs among community samples awaits further study. Although the range of scores on these measures was elevated relative to those in community samples, there is no evidence to suggest the factor structure would differ. Indeed, similar to other factorial studies among youth, our findings suggest that extant measures of cognition represent both overlapping cognitive constructs (i.e., dysfunctional attitudes and cognitive distortions; hopelessness and negative beliefs of the self and the world) as well as unique cognitive constructs (i.e., positive problem solving).

Finally, although the current findings confirm that specific cognitive factors are associated with depressive symptoms, it is unclear whether these factors are also related to other forms of psychopathology. Because all youth in the present study were depressed, future research is needed to determine the role of these cognitive factors in the etiology and maintenance of other disorders such as anxiety, disruptive behavior disorders, or attention deficit/hyperactivity disorder.

Clinical Implications

Results of the present study indicate that there is considerable overlap among extant measures assessing depression-related cognitions in youth that reflect four distinct constructs: Cognitive Distortions and Maladaptive Beliefs, Cognitive Avoidance, Positive Outlook, and Solution-Focused Thinking. The factors identified in this study may be helpful to researchers and clinicians in guiding the selection of instruments for assessing depression-related cognitions. Among the extant measures, scales from the the DAS, the SPSI–R, and the CTI had the highest loadings on Factors 1 to 4 and may prove sufficient for assessing the four constructs identified in this study while also reducing the burden on teens. Because these maladaptive cognitions are associated with higher depressive symptoms, their assessment may provide additional insight into the causes or maintaining factors of depression for an individual child. In addition, because three factors predicted treatment outcome, reducing maladaptive cognitions and cognitive avoidance during the course of any treatment may enhance the efficacy of current interventions.

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TABLE 1

Baseline and Posttreatment Means, Standard Deviations, and Cronbach's Alphas for Cognitive Measures and Depression

				Week 12		
Instrument	**Scale**	**Baseline N**	**M ± SD**	**Alpha**	**N**	**Week 12 M ± SDM**
BHS	Total Score	390	9.92 ± 5.50	0.89	338	5.88 ± 4.97
CNCEQ	Total Score	390	62.32 ± 20.51	0.94	330	49.07 ± 19.60
CTI–C	View of the Self	390	13.82 ± 5.30	0.83	333	17.09 ± 5.27
CTI–C	View of the World	390	12.11 ± 4.33	0.75	334	15.07 ± 4.43
DAS	Perfectionism	390	53.51 ± 17.74	0.91	334	44.74 ± 19.46
DAS	Need for Social Approval	390	44.73 ± 12.62	0.84	334	38.85 ± 12.90
SPSI–R	Positive Problem Orientation	390	7.75 ± 3.64	0.71	328	8.73 ± 4.04
SPSI–R	Negative Problem Orientation	390	19.61 ± 8.98	0.90	327	14.36 ± 8.13
SPSI–R	Rational Problem Solving	390	29.21 ± 14.39	0.94	329	31.18 ± 16.09
SPSI–R	Impulsivity/Carelessness	390	15.83 ± 7.70	0.87	327	13.64 ± 16.60
SPSI–R	Avoidance Style	390	11.95 ± 5.72	0.82	327	9.59 ± 5.61
CDRS–R	Total score	390	59.86 ± 10.41	0.71	341	37.64 ± 13.37
RADS	Total score	386	79.13 ± 14.11	0.90	337	61.88 ± 16.60

Note: N =390. BHS =Beck Hopelessness Scale; CNCEQ =Children's Negative Cognitive Errors Questionnaire; CTI–C =Cognitive Triad Inventory for Children; DAS =Dysfunctional Attitudes Scale; SPSI–R =Social Problem Solving Inventory–Revised; CDRS–R =Children's Depression Rating Scale–Revised; RADS =Reynolds Adolescent Depression Scale.

TABLE 2

Pearson Correlations Among All Variables

	CNCEQ	CTI–C (Self)	CTI–C (World)	DAS (Per)	DAS (Soc)	SPSI–R (Pos)	SPSI–R (Neg)	SPSI–R (Rat)	SPSI–R (Imp)	SPSI–R (Avd)
BHS	.46***	−.64***	−.57***	.41***	.41***	−.37***	.43***	−.12*	.28***	.38***
CNCEQ	—	−.54***	−.37***	.63***	.56***	−.14**	.50***	.01	.30***	.40***
CTI–C (Self)		—	.72***	−.53***	−.49***	.41***	−.58***	.14**	−.35***	−.47***
CTI–C (World)			—	−.35***	−.35***	.34***	−.47***	.09	−.28***	−.38***
DAS (Per)				—	.69***	−.14**	.45***	.04	.29***	.34***
DAS (Soc)					—	−.17***	.46***	.07	.26***	.36***
SPSI–R (Pos)						—	−.23***	.70***	−.10	−.26***
SPSI–R (Neg)							—	.02	.61***	.74***
SPSI–R (Rat)								—	−.17***	−.07
SPSI–R (Imp)									—	.64***

Note: N =390. BHS =Total Score; CNCEQ =Total Score; CTI–C (Self) =View of Self scale; CTI–C (World) =View of World scale; DAS (Per) =Perfectionism; DAS (Soc) =Need for Social Approval; SPSI–R (Pos) =Positive Problem Orientation; SPSI–R (Neg) =Negative Problem Orientation; SPSI–R (Rat) =Rational Problem Solving; SPSI–R (Imp) =Impulsivity/Carelessness; SPSI–R (Avd) =Avoidance Style.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

TABLE 3

Rotated Factor Pattern and Interfactor Correlations from Principal Axes Factoring and Oblique Rotation of the Cognitive Measures

Instrument	Scale	Factor 1	Factor 2	Factor 3	Factor 4
DAS	Perfectionism	**.83**	−.01	.02	−.01
DAS	Need for Social Approval	**.76**	.00	−.01	.01
CNCEQ	Total Score	**.63**	.08	−.10	.02
SPSI–R	Impulsivity/Carelessness	−.01	**.82**	.11	−.06
SPSI–R	Avoidance Style	.01	**.78**	−.06	−.02
SPSI–R	Negative Prob. Orientation	.10	**.67**	−.20	.08
CTI–C	View of the World	.08	−.01	**.84**	−.05
CTI–C	View of the Self	−.16	−.04	**.73**	.04
BHS	Total Score	.14	−.01	**−.61**	−.06
SPSI–R	Rational Prob. Solving	.04	−.06	−.13	**.85**
SPSI–R	Positive Prob. Orientation	−.04	.04	.22	**.75**
Interfactor correlations					
Factor 2		.52			
Factor 3		−.63	−.55		
Factor 4		−.04	−.15	.43	

Note: Variables with highest factors loadings are bolded. *N* =390. BHS =Beck Hopelessness Scale; CNCEQ =Children's Negative Cognitive Errors Questionnaire; DAS =Dysfunctional Attitudes Scale; CTI–C =Cognitive Triad Inventory for Children; SPSI–R =Social Problem Solving Inventory.

TABLE 4

Correlations Between Cognitive Factors and Depression

Measure	Factor 1	Factor 2	Factor 3	Factor 4
RADS Total Score	0.55**	0.46**	−0.68**	−0.15**
CDRS–R Total Score	0.22**	0.18**	−0.30**	−0.14**

Note: RADS =Reynolds Adolescent Depression Scale; CDRS–R =Children's Depression Rating Scale–Revised.

* $p < .05$.

** $p < .01$.

TABLE 5

Cognitive Predictors of Acute Treatment Outcome in TADS

Outcome	Cognitive Factor	Factor Main Effect F Statistic	Factor ×Treatment Interaction Effect F Statistic	Factor ×Treatment ×Time Interaction F Statistic	Status
CDRS–R	Factor 1: Cognitive Distortions and Maladpative Beliefs	11.78***	0.76	1.22	Predictor
	Factor 2: Cognitive Avoidance	8.87**	0.14	0.47	Predictor
	Factor 3: Positive Outlook	29.67***	0.26	1.09	Predictor
	Factor 4: Solution-Focused Thinking	3.58	1.66	0.79	
RADS	Factor 1: Cognitive Distortions and Maladpative Beliefs	119.60***	0.67	1.81	Predictor
	Factor 2: Cognitive Avoidance	71.07***	1.17	2.66*	Moderator
	Factor 3: Positive Outlook	284.76***	0.64	4.13**	Moderator
	Factor 4: Solution-Focused Thinking	3.21	2.43	1.17	

Note: Results from individual random coefficients regression models that evaluated (a) random effects of patient and patient by time and (a) fixed effects of treatment, time, the cognitive factor and its two- and three-way interactions. The fixed effect of site was included since treatment are nested within site and time was defined as the natural log of time. Table 5 presents the main effect of the Cognitive Factor and its interactions with treatment and Treatment ×Time. CDRS–R =Children's Depression Rating Scale–Revised; RADS =Reynolds Adolescent Depression Scale.

* $p < .05$.

** $p < .01$.

*** $p < .001$.